

31 1910 A SCIENTIFIC AMERICAN

THE PHILIPPINE ISLANDS

757752 8



CEMENT RAW MATERIALS



PANAMA PACIFIC
INTERNATIONAL EXPOSITION
SAN FRANCISCO CALIFORNIA

BFG 16, no. 16

CEMENT RAW MATERIALS OF THE PHILIPPINES

REINFORCED concrete is the only construction material approved with any degree of unanimity by engineers for structures which are to resist the effects of earthquakes. As a consequence it has been employed for first-class construction in the Philippines since American occupation to the practical exclusion of other building material. The cement used for concrete in the Philippines is imported, and for a number of years the importations have amounted to more than 300,000 barrels annually. There is a duty of 30 cents a barrel on imported cement, which, with transportation charges, has kept the cost generally above \$2 a barrel. Formerly the bulk of such cement was secured from Hongkong and French Indo-China, but during the past year the imports from Europe have increased until they now constitute more than half the total. Strange as it may seem, American manufacturers have not taken advantage of the Philippine market in spite of the fact that American cement enters the Philippines free of duty, thus enjoying an advantage of 30 cents a barrel in price.

Lack of capital and the high price of fuel have prevented the local manufacture of cement up to the present time, but there is now under construction at the town of Binangonan, near Manila, a rotary plant for cement manufacture. Here, again, the Philippines have borrowed from Europe rather than America, both in the capital which is represented and in the machinery which is being installed. The new company, known as the Rizal Cement Company, has purchased German equipment exclusively. The plant is under the direction of

German technical men, and German methods of manufacture are to be followed. The initial capacity of the new plant will be only 30 barrels per day, an output which is not sufficient to meet the local demand, but which will undoubtedly be increased after the plant is once established.

The Bureau of Science has devoted considerable attention to the possibility of manufacturing Portland cement in the Philippines, and has indicated a number of places at which such manufacture could be carried on advantageously. In the Visayan Islands, more particularly on Cebu Island, there are large deposits of an impure coralline limestone, the composition of which approaches very closely to that of a raw mixture for Portland cement. This limestone is exceedingly soft, occurs in such relations that it may be quarried without the removal of any overburden, and is found adjacent to existing railroads at sites which possess also natural harbor facilities. Clay suitable for admixture with this limestone, which in reality only requires 6 parts of clay to 100 parts of the stone itself to produce an appropriate mixture, is likewise available at the plant site. In addition there are undeveloped deposits of coal within a distance of a few miles, of such character that it could be successfully used for burning Portland cement in rotary kilns. While Manila is, at this time, the chief distributing point for the Philippine Islands, yet Cebu, by reason of its central location, offers a better situation from which to distribute products manufactured locally. Altogether, the conditions at the proposed plant site in Cebu are specially adapted for the manufacture and marketing of Portland cement.

Aside from the coralline limestone in the Visayan Islands, which might correctly be classed as a cement rock, there are in the Philippines abundant and widely distributed formations of practically pure crystalline limestone. With these are usually

to be found suitable siliceous materials for a cement mixture such as clay, shale, or volcanic tuff. The Rizal Portland Cement Company will use such a limestone which is found in the mountains about 4 miles from the town of Binangonan. For the required siliceous material to combine with the limestone, they will quarry a fragmentary andesitic tuff which is encountered adjacent to the limestone quarry site. Both materials will be brought to the mill over an aerial cableway. Fuel for this plant will be imported, and will come through Manila, with which port the plant has communications by water. The crystalline limestones generally, as in this case, are found in more or less mountainous regions, and they possess the further disadvantage of being exceedingly hard and, therefore, more difficult to quarry and crush than the Visayan coralline limestone. The volcanic tuffs in the Philippines generally are better adapted for Portland cement mixtures than clay and shale by reason of their chemical composition. On the other hand, while some of the tuffs are exceedingly fine grained and very uniform, a great many others are made up of larger fragments and are, therefore, not homogeneous.

Natural cement could be manufactured in the Philippines from the same raw materials which are proposed for Portland cement. The Visayan coralline limestone might be burned alone to produce a natural cement, but elsewhere it would probably be necessary to burn an artificial mixture of raw materials, employing a lower temperature than is required for Portland cement.

The Philippine penal colony at Iwahig, Palawan, manufactures its own construction material. In the past the colony has confined itself to making bricks, but it has recently been pointed out that fine coralline sand which is found in great quantity adjacent to the colony might be used with brick clay for the

production of a natural cement. Natural cement would serve the same purpose as the brick which has been used heretofore and which is not of good quality. The manufacture of natural cement would not require the investment nor the precise manipulation which is entailed in the manufacture of Portland cement.

The imports of Portland cement into the Philippine Islands during the year 1913 amounted to 425,000 barrels, the invoiced cost of which, exclusive of duty and local wharfage charges, was \$1.90 a barrel. On the Manila market cement brings from \$2.25 to \$2.75 per barrel. The demand for Portland cement in the Philippines is sufficient to absorb the entire output of a single small manufacturing plant, and the current price for cement is sufficient to leave a handsome margin of profit to the manufacturer.

REFERENCE

The Mineral Resources of the Philippine Islands. Bureau of Science, Manila. 1908-1913. Philippine raw cement materials. *The Philippine Journal of Science, Sec. A* (1909), 4, 211-229. No. 3.

Burning tests of Philippine Portland cement raw materials. *Phil. Journ. Sci., Sec. A* (1914), 9, 79-103. No. 1.



